

Architecture for Integrated System Health Management, Phase I

Completed Technology Project (2006 - 2006)



Project Introduction

Managing the health of vehicle, crew, and habitat systems is a primary function of flight controllers today. We propose to develop an architecture for automating many of the response actions in problem situations and coordinating these actions with human response activities. Our approach is to develop a basic module that automates (1) Planning what response actions to take, (2) Executing these planned actions, and (3) Monitoring the effects of these actions to ensure they are successful. These modules will be organized into layers, operating at different levels of abstraction and with different time constants and time horizons. The architecture will support both hierarchical coordination between layers of control and peer-to-peer interaction among modules within a layer. This proposal is innovative in combining centralized planning for hierarchical coordination with distributed negotiation techniques for peer-to-peer coordination to provide flexible contingency response. The successful completion of a Phase II project will deliver a system health management architecture to NASA that improves system safety and makes more effective use of human time and capabilities when problems occur.

Anticipated Benefits

Potential NASA Commercial Applications: Commercial products for managing failures focus on alerting limit violations and diagnosing root cause of problems, leaving problem response to human operators. By automating aspects of problem response and supporting coordination of these actions with human response, the software developed under Phase II of the proposed project is targeted toward a commercial market with few competitors. Potential markets for this software include industries where timely problem detection and response is essential to the safety of personnel and the productivity of the plant. Example applications where these criteria are important include chemical process plants, the nuclear industry, and control of naval ships and submarines.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

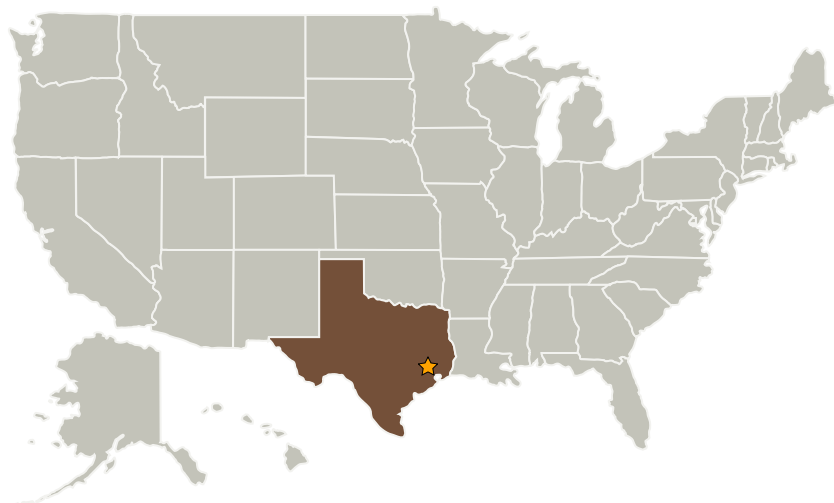
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Metrica, Inc.	Supporting Organization	Industry Minority-Owned Business, Women-Owned Small Business (WOSB)	San Antonio, Texas

Primary U.S. Work Locations

Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Debra L Schreckenghost

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.4 Execution and Control